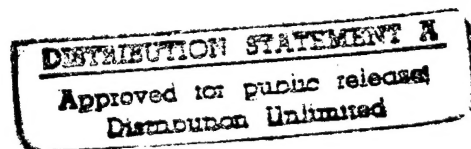




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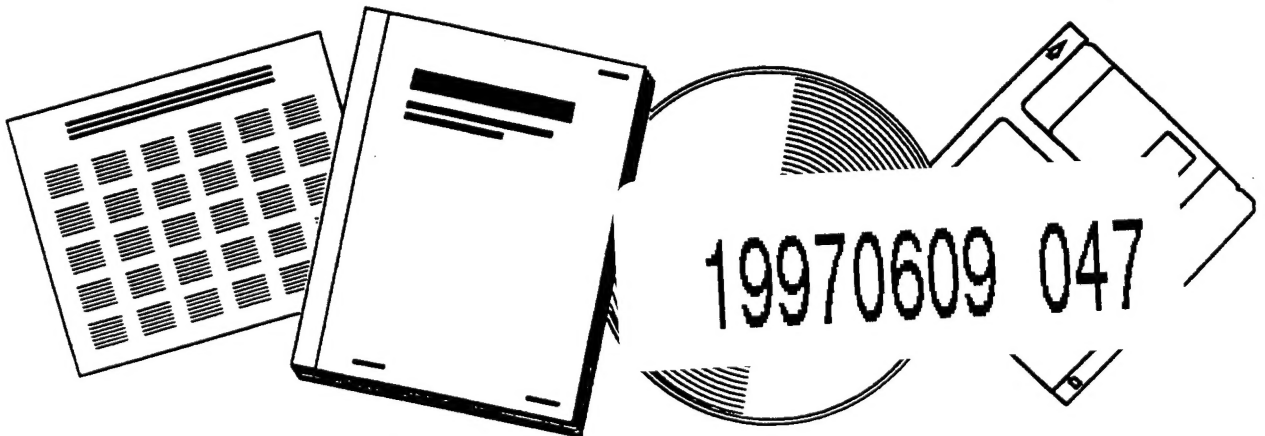
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CALS: WHITE PAPER REPORT ON FUNCTIONAL ECONOMIC ANALYSIS AND THE FEA MODEL (FEAM)



CALS INDUSTRY STEERING GROUP
WASHINGTON, DC

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Abstract: The paper investigates the use, application, and lessons learned from our experiences in performance of Functional Economic Analyses with and without the aid of computer-based software. Initially promoted as a tool in support of the DoD Corporate Information Management (CIM) initiative, FEAs have become a requirement for any DoD funded project focusing on process improvement. The FEA is both an evolving methodology and a management tool to determine and document the costs and benefits of functional process improvements and related investments in information technology.

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CALS



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**WHITE PAPER REPORT
ON
FUNCTIONAL ECONOMIC ANALYSIS
AND THE
FEA MODEL (FEAM)**

PREPARED BY:

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SPARES ACQUISITION AND LOGISTIC
SUPPORT ANALYSIS COMMITTEE**

1 NOVEMBER 1993

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WHITE PAPER - FUNCTIONAL ECONOMIC ANALYSIS (FEA) & MODEL

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SECTION 1 : EXECUTIVE OVERVIEW/SUMMARY

This white paper is produced in response to a request from the Department of Defense (DoD) Office Of the Assistant Secretary of Defense (OASD), regarding the use, application, and lessons learned from our experiences in performance of Functional Economic Analyses with and without the aid of computer-based software. The SALSA Committee is a task group with affiliation to the DoD/ISG CALS/CE Product/Process Division within the Logistics domain.

As the global defense posture continues to change a number of resultant changes have been occurring to both the DoD and it's supporting supplier base. The imperative of investment in weapons systems technology must continue to assure readiness but only with firm, analytical rationale. As such the Defense Management Review Board (DMRD) has established as a goal reductions in the costs associated with DoD functions while maintaining current operational capacity (readiness). Supporting this goal is the concept of Functional Economic Analysis (FEA). Initially promoted as a tool in support of the DoD Corporate Information Management (CIM) initiative, FEAs have become a requirement for any DoD funded project focusing on process improvement. A number of publications are available to provide guidance and direction in the performance of FEAs as well as personal computer based software supporting the FEA concepts. Information regarding FEAs can be obtained by contacting the Director of Defense Information (DDI) at 1-800-835-5246.

The FEA is both an evolving methodology and a management tool to determine and document the costs and benefits of functional process improvements and related investments in information technology. It is an integral part of the Functional Process Improvement (FPI) Cycle in that it is the mechanism which permits completion of both the evaluation and planning stages of process improvements. It applies a disciplined process for evaluating any type of improvement investment as well as serving as a data collection device providing information relevant to decision support. Application of the FEA Model (FEAM) software, permits a consistent, and standard format from which investment options can be viewed and commonly understood. It serves as a business forecasting tool supporting not only future process and technology improvements but also permitting investigation into current practices.

The FEA is based upon some basic concepts fully supporting functional process improvement. Investment scenarios can be forecast utilizing Constant versus Current Dollars; a Tooth to Tail Ratio calculation supports and institutionalizes the DMRD goal of functional cost decreases with sustained operational capacity; Risk Adjustment and Simulation calculations permit range definition and factoring increasing forecast accuracy; and use of the Office of Management and Budget (OMB) "real" discount rate provides stability to FEA outputs. FEA outputs can be generated to support investment decisions including Baseline Costs, Alternative Costs, Cost Element Definitions, Fiscal Year calculations, Operational and Management & Support Costs, and Life Cycle Management Phase Costs. The FEA, and it's associated software, free management from tedious data collection and coordination tasks so that their time can more appropriately be focused on functional process improvement.

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SECTION 2 : FUNCTIONAL ECONOMIC ANALYSIS - INTRODUCTION

Three general principles have guided the development of the FEA methodology.

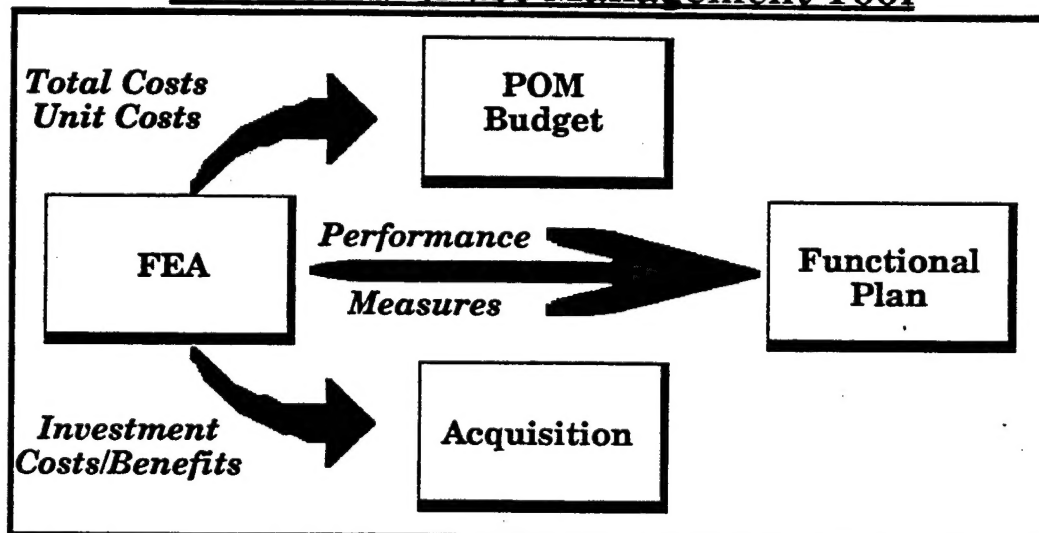
Functional Focus. Although the Director of Defense Information (DDI) has introduced FEA to the Department of Defense (DoD), Functional Economic Analysis focuses on evaluating changes to functional processes, not information systems. FEA is designed to provide the manager with the bottom-line understanding needed to use all types of resources effectively in meeting DoD objectives.

Measurement. The FEA methodology requires measurement of key attributes of functional processes, such as costs and outputs. For the functional manager, quantitative measures are important in assessing the current state of the function, in setting substantive objectives, in evaluating alternative ways to achieve those objectives, and in gauging progress toward the objectives.

Management Tool. The FEA is designed to be an ongoing management tool, not a one-time reporting requirement. The FEA can support the functional manager in responding more quickly, and consistently, to analyses required for the existing acquisition and programming/budgeting processes. For acquisition support, the FEA shows both the costs and benefits of planned investments. For programming/budgeting support, the FEA shows projected function costs by fiscal year. The FEA also provides the management information, such as performance measures, needed to monitor progress toward functional process improvement objectives within the functional plan.

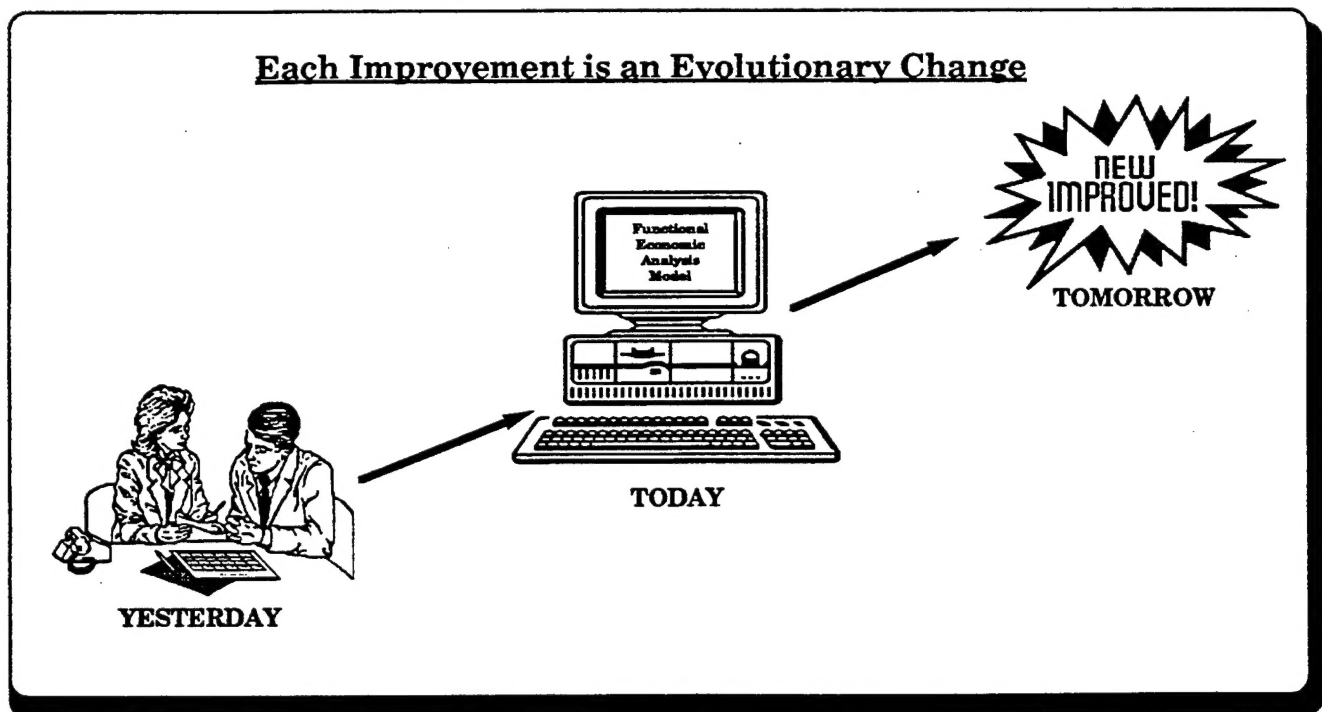
These principles help to define what "good" functional economic analysis is and show it's usefulness in managing functional activities.

FEA - A Multi-use Management Tool



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Since FEA is a relatively new DoD methodology it is being applied by a limited number of DoD OSD organizations and implementation is being done on a phased basis (reference: ASD (C3I) Memorandum, dated 22 October 1992). FEA is an evolving methodology. It will change as new techniques and tools are developed and as experience is gained in applying the methodology. Eventually FEAs will be required of all DoD organizations to determine and document the costs and benefits of functional process improvements and related investments in information technology.

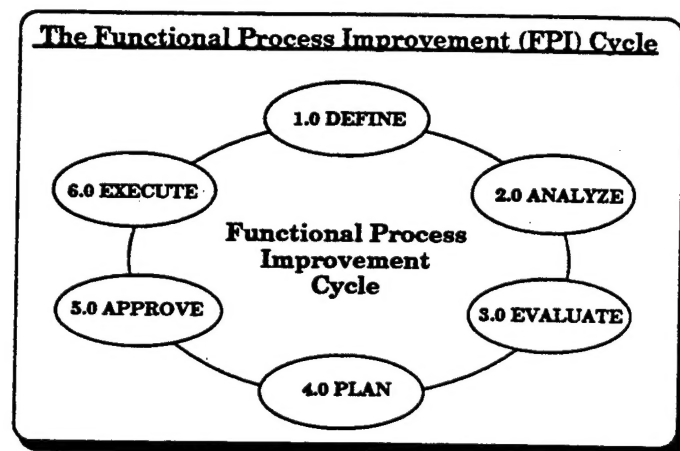


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SECTION 3 : FEA AND FUNCTIONAL PROCESS IMPROVEMENT (FPI)

Facilitation of cost-effective improvements in the way DoD performs it's functions is one of the primary strategies established by the DDI through the introduction of Corporate Information Management (CIM). To support this strategy, the DoD has developed the Functional Process Improvement (FPI) Program. FPI represents a structured approach for identifying, evaluating, and implementing improvements to the current DoD processes. It establishes a cyclical, continuous improvement, philosophy and is highly dependent on the understanding, application, and evaluation of FEAs. The FPI Cycle is illustrated herein with a brief description of each phase following:



Define. To establish the framework for the FPI effort, the cycle begins by defining the baselines, objectives, and strategies for the functional area under the direction of an OSD Principal Staff Assistant (PSA). Baselines describe WHERE the function is now, in terms of processes, costs, performance measures, automated information system (AIS) inventories, and other attributes. Knowing where the function is now is a necessary prerequisite to determining where it should go, which is specified in the function's objectives. Strategies describe, in general terms, HOW the function will get from its baseline to its objectives. Baselines, objectives, and strategies are also known collectively as functional direction.

Analyze. With the FPI framework developed, the work of analyzing current processes to identify potential improvement opportunities begins. Activity and cost models are used in both the Define and Analyze phases. They provide a structured approach for documenting current processes and understanding how improvements to those processes might work. Ideas for improvement opportunities can come from a variety of sources, including an assessment of current obstacles to meeting the function's objectives, surveys of

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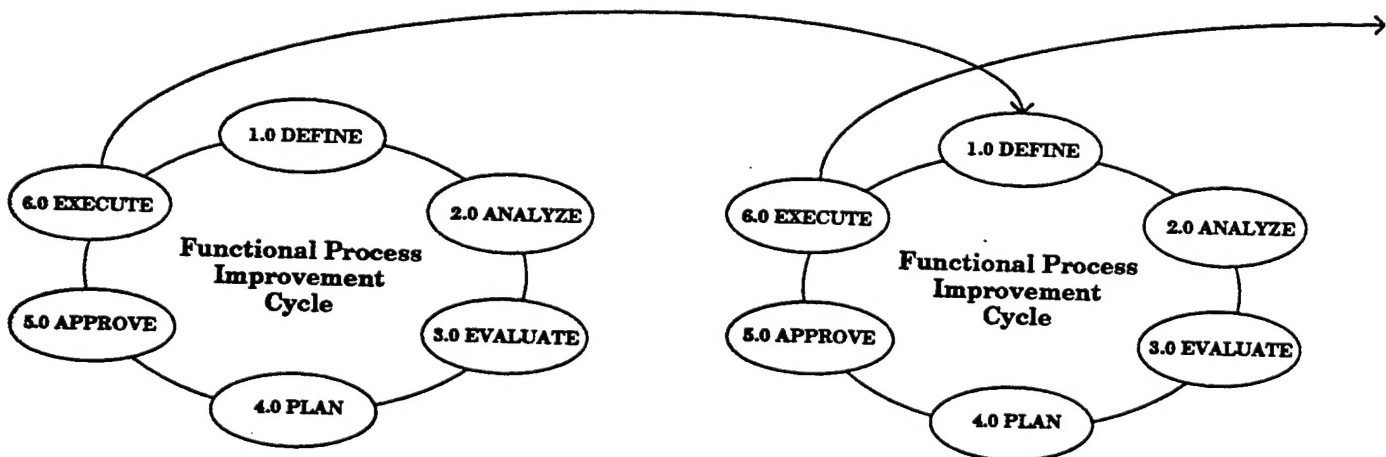
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best business practices relevant to the function, the analysis of data sources and information flows, and the process of building activity and cost models.

Evaluate. FEA is the primary activity in the third phase of FPI. Here improvement opportunities, which describe WHAT should be changed, are turned into initiatives by considering HOW the improvement opportunities should be implemented. Initiatives are then packaged into alternatives, each of which describes a possible plan for moving the function to its objective. With the alternatives defined, FEA proceeds with an evaluation of the alternatives, constructing financial and nonfinancial measures of merit to help the functional manager determine the best course of action to follow.

Plan, Approve, and Execute. With a promising alternative selected, the more detailed planning required to implement the alternative is performed. Then, approval of the proposed changes is approved, and the changes are executed.

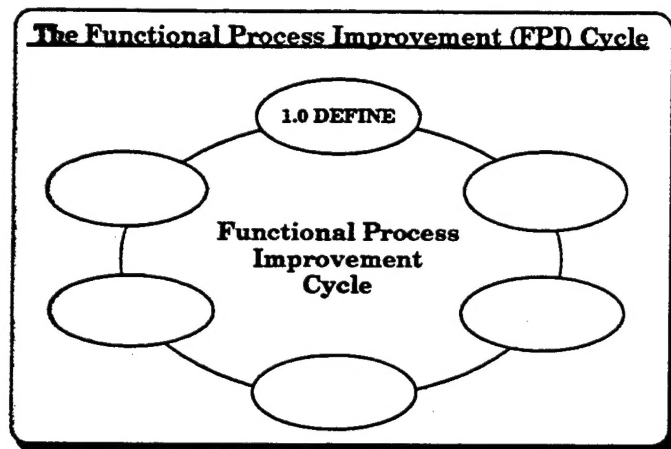
Note that FPI is an iterative process. After one round of changes is under way, the search for more improvements begins anew. Understanding the full potential of improvement alternatives requires a complete, and thorough, understanding of FPI and FEA. Thus, this white paper defines the FEA within the context of FPI program.



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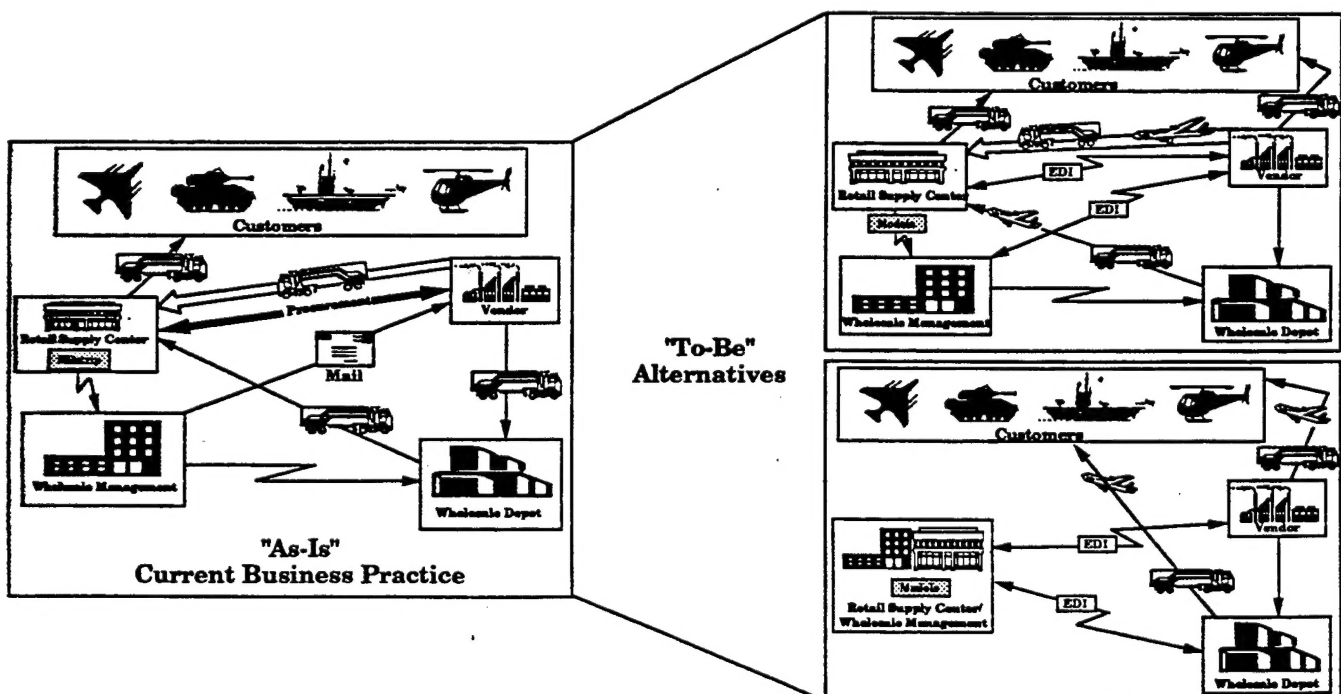
SECTION 4 : FEA DIRECTION AND GUIDANCE



Define. Preparation of the FEA begins by understanding top management's intentions and goals for the function. Functional direction includes long-term objectives, measures and targets for assessing achievement toward those objectives, and strategies for meeting the objectives.

Functional objectives provide a framework for accomplishing missions and conducting ongoing operations. This framework links missions and operations to strategic direction and

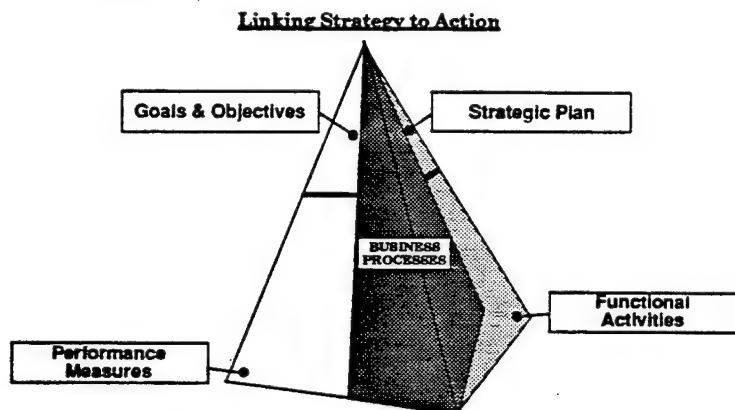
joint war fighting requirements, as well as to planned improvements in peacetime effectiveness and efficiency. These objectives support a top-down, long-range view (10+ years) of the function, but also focus on near-term (1 - 6 years) operational goals, including priorities for process improvements.



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Top management identifies performance measures for functional objectives and the function's primary outputs. These measures are quantified during analysis of the current state, "As-Is", process and for each alternative "To-Be" improved state. These measures must be meaningful to and achievable by the functional manager responsible, and must be consistent with the strategic goals and objectives of the organization. This consistency establishes the link between functional activities and strategic plans.



An FEA considers functional activity levels caused by outyear workloads. Workload is expressed as potential activity output and is used to forecast/calculate unit cost. However, workload alone does not cause future increases/decreases in cost. Changes in efficiencies, input cost, and quality standards also influence cost. Using performance measures, activity costing establishes the relationships between outputs and resource inputs, and permits identification of cost drivers. Some of these relationships have been observed to behave in a fixed manner while others behave variably. These relationships provide insight for calculating outyear resource requirements and costs and formulate the basis for FEA.

Prior to undertaking process improvement, the scope of the improvement has to be defined. This includes the current funding level and the workload estimates over the planning period under consideration. Utilizing the "As-Is" model, created as part of functional direction, a determination of an initial BASELINE can be made. The initial baseline is a reference position for measuring progress in process improvement and related cost analyses. It provides the financial profile of the funds needed to satisfy current and future functional workloads. This baseline will be used as input to the FEA model which will apply appropriate inflation indices and compute savings from alternative "To-Be" improvements.

The FEA will compare the projected future costs of each improvement alternative to the current baseline thus future costs must be projected for the baseline. All costs, both fixed and variable, expended in the performance of an activity must be added. This technique is known as ACTIVITY COSTING and is the basis for figuring out the current cost of doing business (CODB). Activity costing has several uses throughout the process improvement effort from guiding activity modeling efforts to measuring the actual cost of functional activities. An activity

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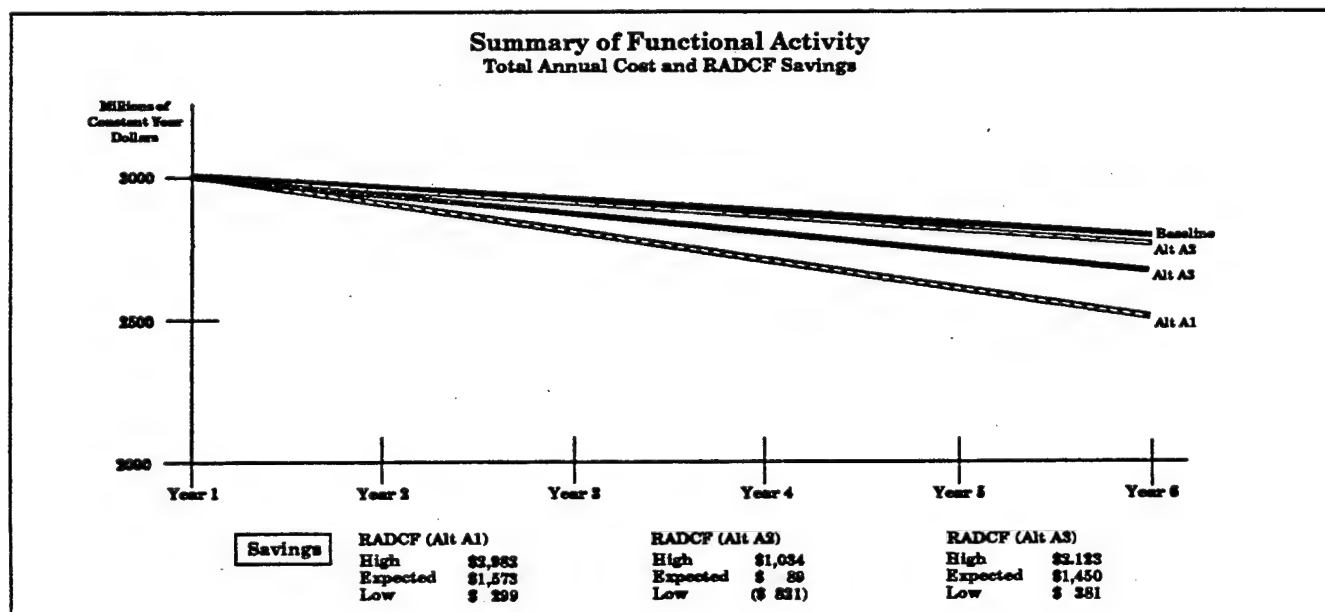
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cost worksheet captures the historical costs associated with the current method of doing business. The FEA shows future costs for the baseline and for each improvement alternative.

Activity Cost Worksheet

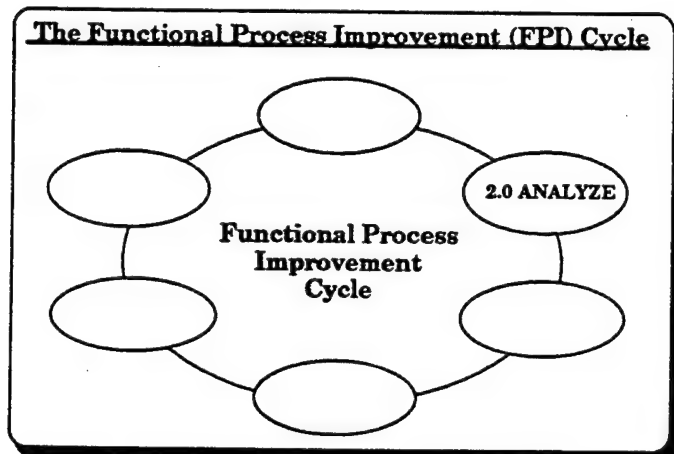
Activity	Civilian Labor	Military Labor	Information Technology	Facilities	Material	Other	Activity Cost (\$)	Activity Output	Unit Cost (\$)	Operations (%)
A1	100	240	50	30	120	40	580	200	2.90	100
A2	200	80	40	45	50	15	430	50	8.60	0
A3	300	120	150	80	70	20	740	100	7.40	50
	600	440	240	155	240	75	1750	100 *	17.50 *	54.38 *

* Figures are not additive.



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Analyze. Alternatives are formed during the analysis phase. FEA procedures call for at least two alternatives to the baseline and emphasize functional improvement before technical improvement (better vs. faster).

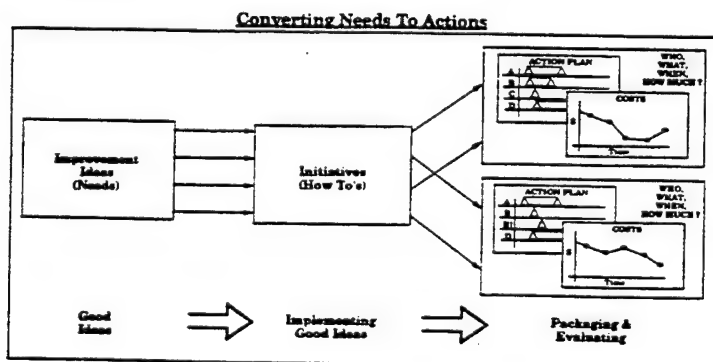
Alternatives are developed to provide functional management with insight to the financial and operational impact of proposed improvement changes. Each alternative consists of a

slate of initiatives which, when achieved transition a functional activity to an intended "To-Be" state. Alternatives change one or more of the basic elements inherent to the functional process: a different input, a different control (rule of business), a different capability (ie. less waste), a different skill or skill level, or a different set of performing actions/process steps. While each of these changes can be made independent of the others, at least one of these factors must be different in the alternative than in the baseline.

Improvement opportunities are what needs to be done to the current functional process to move toward one or more of the future alternative "To-Be" states. Improvement opportunities can be changes to prevent or correct problems or deficiencies, to reduce product defects, to emulate best practices, or to implement new technology and/or innovations.

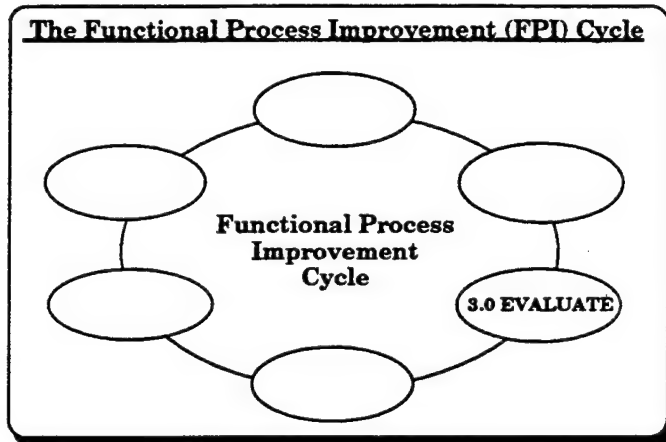
Initiatives illustrate *how* improvements can be accomplished and are typically formulated as projects and related action plans. An initiative has a result or product which requires time and resources. Each initiative must be accompanied by a cost profile that reflects resource use.

An *Alternative* may be represented in the form of a table of *future costs* that identify functional activity and investment. This table may be viewed by cost element, consolidated action plan, and estimated performance values for the purpose of FEA.



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Evaluate. Most of the information required to perform an FEA has been developed in the preceding phases of the FPI program. In particular, baseline activities have been modeled and their costs determined through activity costing, improvement opportunities, and the initiatives required to implement them, have been combined into alternatives, and the costs and benefits associated with the alternatives have been estimated. With this preparation, it is a straightforward matter to array costs for use in the FEA of alternatives. Costs must be arrayed by baseline and by

alternatives with cost element, fiscal year, management support versus operations, and life-cycle management (LCM) phases representing the dimensions of cost data required by the FEA Model (FEAM).

The FEAM is computer software which is intended to support analyses of potential cost-saving alternatives for DoD information management, and to aid functional managers in presenting their "business case". The FEAM is designed to allow the user to enter costs in a spreadsheet format and to get information for a series of alternatives to a budget baseline. The FEAM takes the user-supplied information and performs a Risk-Adjusted, Discounted Cash Flow (RADCF) analysis for each alternative. Four types of computer screens are available for the user. They are: Data Sheet Screen which serves as the vehicle to input data into the model, the Summary Screen which depicts the total costs and savings by function, the Alternative Screen which illustrates the savings associated with a specific alternative, and the Cost Breakout Screen which shows costs broken out by major types of expenses. See Section 5 of this whitepaper for information concerning the FEAM.

Economic analyses express cost estimates in one of two forms: Constant dollars or Current dollars. Constant dollar estimates represent the cost of the resources required to meet each years workload using resource prices from only one reference year. Current dollar estimates calculate the cost of the resources using the estimated prices for the year in which the resources will be purchased. Current dollars are also called "then-year" or "inflated" dollars. The difference between Constant and Current dollar estimates is the inflation rate in resource prices assumed to occur between the reference year and the purchase year. Version 2.3 of the FEAM accepts both dollar estimates. To indicate how well an alternative meets a functional objective the FEAM calculates the ratio of Operations to Management and Support (Ops to M&S) costs (termed the "Tooth to Tail" ratio) for each alternative. The activity cost model provides the framework for dividing function costs into the Ops and M&S categories.

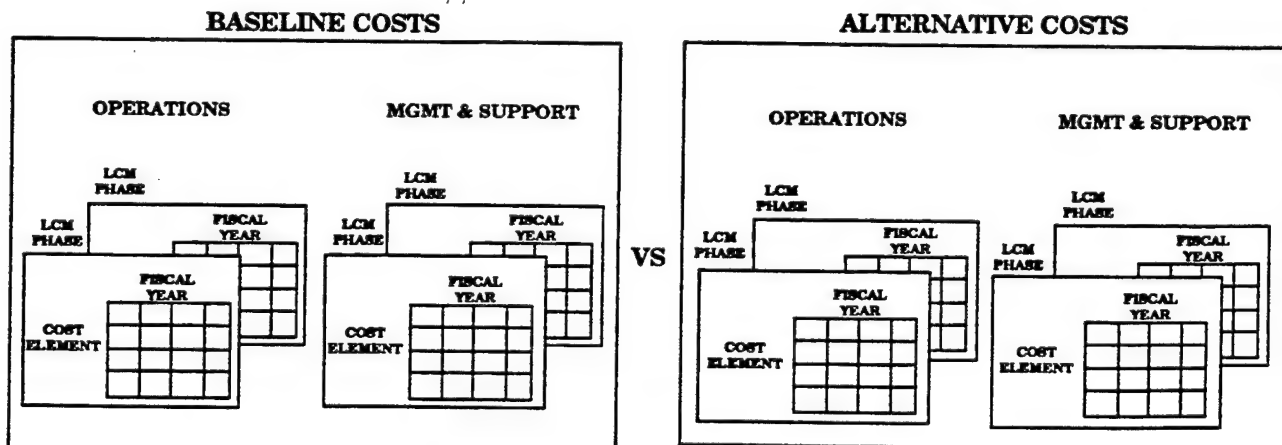
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Version 2.3 of the FEAM divides both Ops and M&S costs into four phases of the acquisition life-cycle - Research, Development, Test, and Evaluation (RDT&E), Investment, Operations, and Disposal. These phases are essential for analyzing and tracking expenditures for information technology projects however, they are not generally required for understanding the costs of a function.

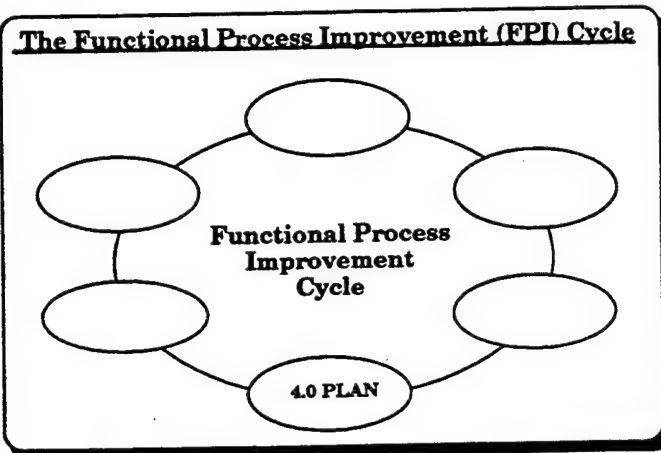
Although the detail of the cost structures of the FEA suggests great precision it is important to recognize that looking into the future must be based on estimates. The accuracy of those estimates depends on the level of certainty, or risk, associated with the changes being proposed. The unit costs developed in activity cost analysis provide the basis for making these estimates. In choosing between different alternatives, it is important that the functional manager not only know the estimated cost of each alternative but also have some idea of the risk associated with each proposal. Through it's risk analysis procedure, the FEAM provides a mechanism for recognizing risk in the comparison of baseline and alternative costs. For each cost cell in the cost structure, the FEAM actually uses a range of cost estimates, rather than a single value, when it calculates the financial indicators comparing alternative and baseline costs. The range of possible cost estimates for a particular cell and the chance any particular value is likely to occur are defined through a probability distribution. Thus extremely low- or high-cost values are assigned lower probabilities of occurring than values near the center of the range or distribution. This is known as a lognormal distribution.

With the cost ranges specified, the FEAM uses a simulation approach to calculate financial indicators, such as the discounted present value of the savings associated with a particular alternative. When evaluating the cost performance of an alternative relative to the baseline what you are really doing is comparing two streams of costs that unfold over time. Converting future dollars into their equivalent present value is called discounting, and the rate at which the conversion is calculated is called the discount rate. The FEAM defaults to a "real" discount rate, the type of rate appropriate for Constant dollar estimates. Discounting policy is also typically specified in "real" terms. Currently the Office of Management and Budget (OMB) provides policy regarding the real discount rate to be used in economic analysis studies for the federal government.



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Plan. The FEA is a "living" document that progresses through three distinct stages - Preliminary, Final, and Update. In this regard, the FEA serves as a management and budget analysis tool to determine and monitor the actual costs and benefits of the selected alternative. The FEA is intended to be a carrier-level document containing not just the results of economic analysis, but also synopses of strategic plans, data and technical management planning, descriptions of alternatives, and other supporting information. Its goal is to

combine in one package the functional, technical, and economic analysis required to make optimum decisions. The Final FEA is also commonly known as the "Business Case".

FEAs should contain eight sections. They are shown herein.

The Eight Sections of FEAs

- Section 1: Functional Area Strategic Plan Summary**
- Section 2: Functional Activity Strategic Plan Summary**
- Section 3: Functional Activity Performance Targets and Measures**
- Section 4: Proposed Functional Activity Improvement Program**
- Section 5: Economic Analysis of Proposed Process**
- Section 6: Data Management and Information System Strategy**
- Section 7: Data and System Changes**
- Section 8: Data and System Cost Analysis**

Section 1 briefly describes and defines major actions that will be taken across the entire functional area, over the next 10+ years, to achieve the area's functional objectives. Section 2 includes a functional activity description (usually an IDEF "As-Is" model), documentation showing how process improvement supports functional area objectives as well as operational and financial objectives, and identification of adjustments to be met through functional activity process change. Section 3 provides explicit identification of quantifiable performance measures established for the functional activity and the associated performance objectives for each measure. Section 4 includes a summary description and explanation of each alternative

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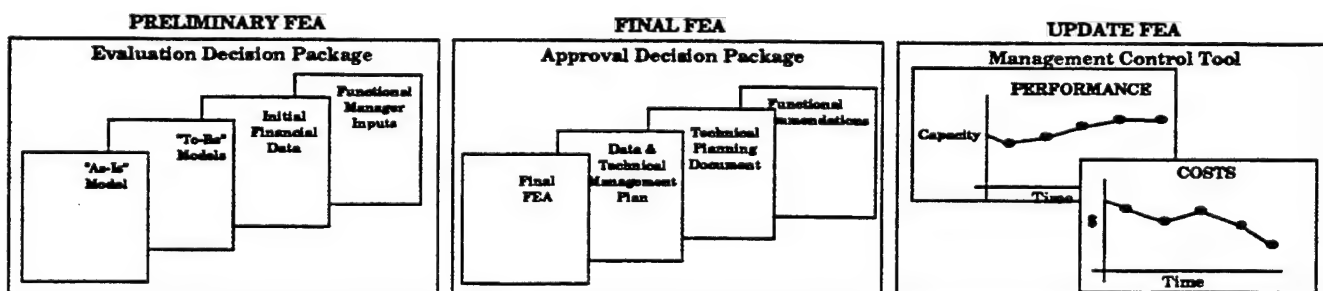
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under evaluation, an explanation of how they support the Functional Area and Functional Activity Strategic Plans, an explanation of how, quantitatively and qualitatively, the alternatives contribute to achieving performance objectives, associated risk level identification, and references to any other sources relevant to describing the alternatives. Section 5 summarizes the results of the economic analysis including any recommendations made based on the analysis. Section 6 describes the technical strategy to deliver data and information support for the functional activity as well as identifying any related technical issues. Section 7 briefly describes the technical changes to data and information system support that will be required to carry out each process improvement initiative. Finally, Section 8 provides a detailed cost-analysis breakdown of the data and system-related information contained in Section 5.

Preliminary FEA. The Preliminary FEA represents an initial "rough order of magnitude" (ROM) assessment of proposed alternatives and is based on readily available financial information. It is presented as part of an Evaluation Decision Package to the functional manager. The manager reviews the package, decides which, if any, process improvement changes should be made, and provides sufficient potential benefits to warrant additional detailed planning.

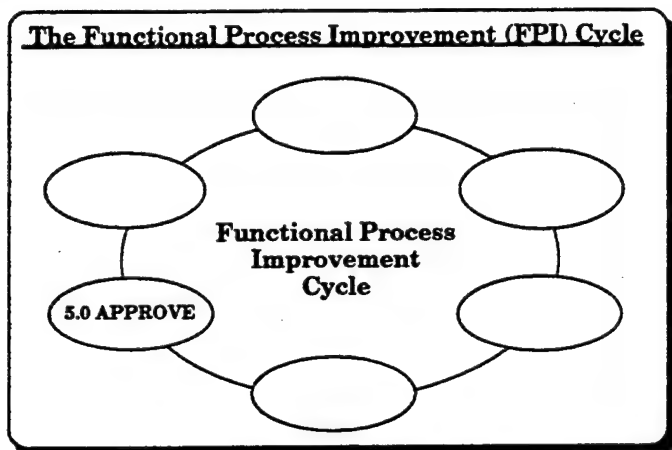
Final FEA. The Final FEA contains a more precise analysis based on a refinement of the cost and schedule data included in the Preliminary FEA and takes into account information from Data management and technical management planning. The Final FEA is presented as part of an Approval Decision Package. The Approval Decision Package is an integrated set of documents consisting of the Final FEA, data management and technical management planning documents, and any appropriate functional management recommendations. This Package is routed through a Functional Steering Committee to the OSD Principal Staff Assistant (PSA).

Update FEA. After an alternative is selected and approved, the functional manager will monitor improvement progress during execution through the use of an Update FEA. The Update FEA is not an economic analysis in itself but is a management control mechanism that indicates whether the anticipated cost savings and performance objectives are being met as scheduled.



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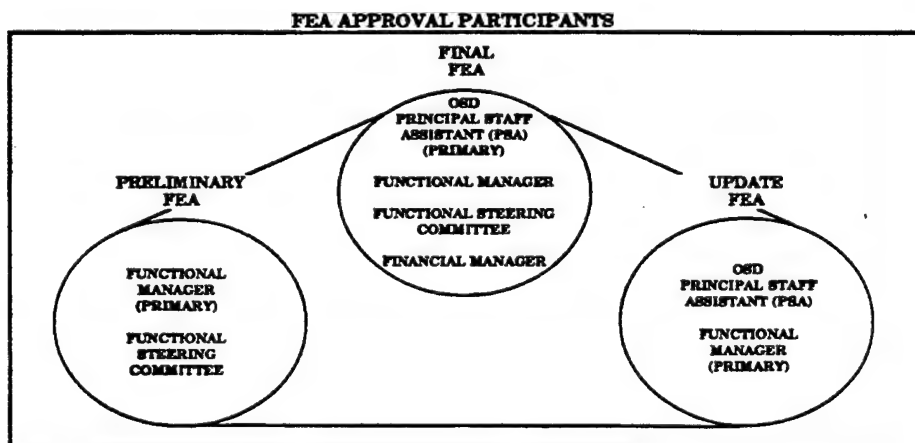
Approve. The three stages an FEA progresses through all have requisite approvals leading to the next successive stage. Approvals are tied directly to the outputs of the stage and are made at appropriate organizational levels.

The goal of the Preliminary FEA is to identify preferred improvement alternatives, based on cost and risks, that merit more detailed functional, technical, and economic analysis.

However, the Preliminary FEA may also suggest that no alternative merits further consideration. The functional manager decides which process improvement changes offer sufficient benefits to warrant detailed planning and serves as the approving authority.

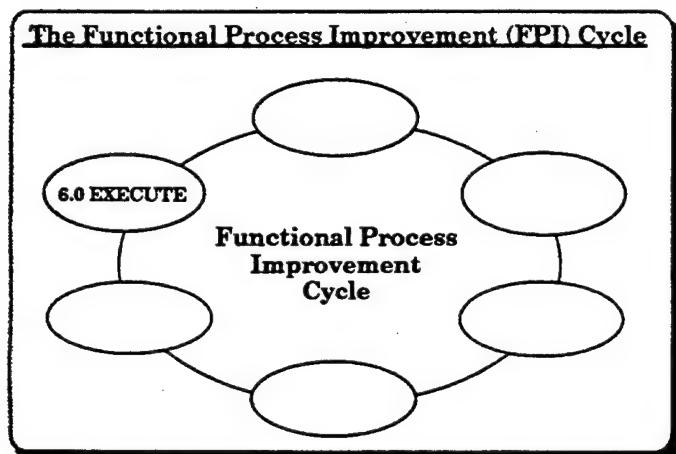
The Final FEA contains a more precise and detailed analysis of the cost, schedule, risk, and benefits associated with an alternative. The goal of the Final FEA is to provide enough detail and improvement justification so as to obtain approval for implementing a particular alternative. Both functional and financial managers should validate the Final FEA. The functional manager secures all necessary advance coordination and forwards an Approval Decision Package to the Functional Steering Committee for review. After review and acceptance by the Functional Steering Committee the functional manager submits the Package to the OSD PSA who is the approving authority.

The Update FEA is utilized as a management tool to help determine if improvement objectives are being met. The functional manager responsible for the alternative monitors progress during execution through the use of the Update FEA. Redirection, termination, or acceleration of the alternative is dependent upon functional management communication of Update FEA information through the Functional Steering Committee to the OSD PSA. Final authority for any action rests with the OSD PSA.



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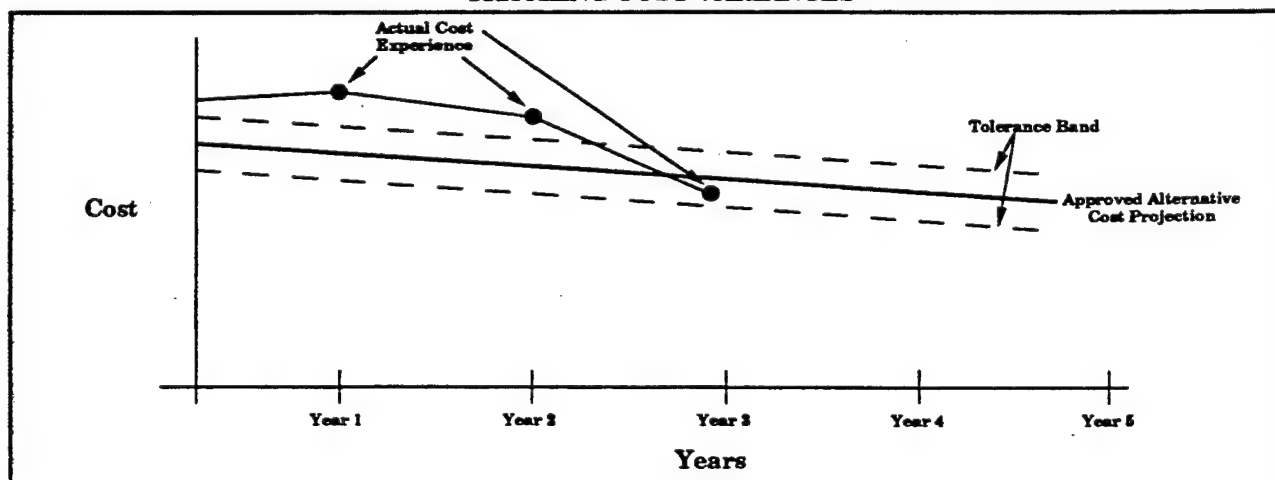
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Execute. When the selected alternative is approved, it becomes the new functional baseline. To maintain the functional baseline, data must be continuously collected as implementation occurs. The functional manager's team should track actual costs, workloads, and performance measures versus estimates. Furthermore, the team should also monitor project status for changes in risk and review assumptions that were used in the financial calculations to see if they are still valid.

During execution of the selected alternative, the team should evaluate variances between the actuals and estimates. Variance tracking will indicate whether savings and performance improvements are meeting expectations. The OSD PSA may specify an allowable "tolerance band" for expected costs and performance measures. Such a tolerance band may be defined as the range between high and low savings estimates and entered into the FEAM. If actual costs increase or performance decreases the functional manager would be responsible for performing root cause analysis and invoking associated corrective action. Serious problems would require intervention by the OSD PSA leading to redirection and/or termination. If actual costs decrease or performance increases this would warrant functional manager recommendations to the OSD PSA for acceleration to reap benefits sooner.

TRACKING COST VARIANCES

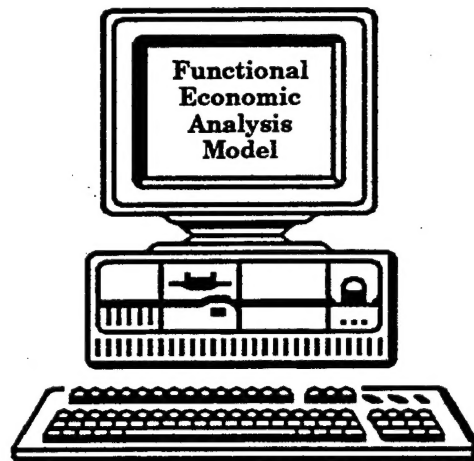


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SECTION 5: FEA MODEL - SOFTWARE

Version 2.3 of the FEAM is designed to work with both Microsoft Excel 3.0 or 4.0 (TM). The FEAM is based on an evolving methodology and, as such, is undergoing continual revision and refinement. Copies of the FEAM, and the User's Guide, can be obtained by calling the DDI at 1-800-835-5246. A FEAM Hotline has been established and can be contacted 24 hours per day by calling (703) 845-6780.



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SECTION 6: LESSONS LEARNED

Both the concept of Functional Process Improvement (FPI) and the tools and techniques for the application of Functional Economic Analysis (FEA and FEAM) have been applied to various initiatives relevant to the activities associated with Tasks owned by the SALSA Committee as well as activities external to the committee but intended to test the useability of FEA. In doing so a number of discoveries have been made as well as potential improvements which will facilitate effective application of both FEAs and the FEAM.

The initial SALSA Committee activity which required application of FEA was Task 3. Identify Cost Benefits Associated with On-Line Provisioning. The process to accomplish the task was defined as a) Secure FEA Model (FEAM) from the DoD CALS Office, b) Identify candidate industry/DoD on-line provisioning efforts, and 3) Document business cases using FEA/FEAM format. Through committee discussion and consensus it was determined that the Northrop Corporation B1 data would be utilized as the initial source from which to apply FEA. However, due primarily to geographical separation, and the potential for competitor access to Northrop proprietary data it was determined that this approach would not be a viable option from which to test the FEA.

Lesson Learned: A DoD customer, without competitive prejudice, could readily have applied the FEA and FEAM. From an Industry Steering Group Committee perspective we still have pressures stemming from competition which does not facilitate complete data disclosure and thus does not permit full functionality testing of either FEA or the FEAM.

As a secondary attempt to apply FEA and FEAM it was determined to utilize the initial data used by the DoD in the development and test of the FEAM. That source was the McDonnell Douglas Aerospace Corporation C17 data. Since one of the task leaders was a McDonnell Douglas employee data gathering was initiated and portions of the FEAM were loaded. Identification and cost collection of On-line Provisioning activities however was not easy to obtain and, in effect, was not being performed thus this approach was also terminated due to the lack of relevant FEA data.

Lesson Learned: The importance of applying FEA is directly tied to the understanding and application of the FPI program. FEA does not effectively work if the initial functional direction is unknown and improvement alternatives are not fully defined and linked to the current state ("As-Is" to "To-Be"). Data integrity is fully dependent upon the first two stages of FPI, Define and Analyze.

A third attempt at applying the FEA and FEAM was proposed to OSD at the 1st Quarter ISG/DoD CALS Conference in Gaithersburg, Md. It was suggested that the FEA and FEAM could be applied to a commercial investment where Computer Aided Software Engineering (CASE) tools were being considered to improve the software development process. Although the "As-Is" process was not in conformance with Mil-Std-2167A it was structured enough to effectively show where technology investments would lead to an improved "To-Be" state. OSD agreed to this approach and recommended that this white paper be geared toward the

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definition and explanation of FEA within the context of FPI. Application of FEA and FEAM on this project was a simple matter of data collection, data input, range definition, and running the simulations. No OMB data was input to the FEAM since none was necessary however, if it was necessary, and available it would have involved nothing more than data loading through the Data Sheet Screen to the FEAM. Running the FEA utilizing the FEAM is a very simple process. Data collection and integrity tends to be the most difficult task facing analysts running FEAs.

Lessons Learned: The first two phases of FPI, Define and Analyze, are critical to the successful completion of FEAs. FEA, within the context of FPI, is phase 3, Evaluate, and is the primary mechanism utilized in phase 4, Plan.

Defining cost ranges within the FEAM establishes the boundaries from which simulations are run. Based on the lognormal probability distribution values nearer the center of the range are assigned higher probabilities and thus are simulated more than those on the lower or higher ends. If the cost range is very wide simulations can take an inordinate amount of processing time. To alleviate this situation ranges should be tightly defined, and if an exact, or certain, cost is known the same number should be load to both the high and low ranges to decrease excessive compute time.

The FEAM has specific defaults. These include a "real" discount rate (as determined by OMB) of 10%, estimates in Constant versus Current dollars, and Plot dollars in millions of dollars per year. Although effective for use in DoD environments these defaults may not be appropriate for utilization of the FEAM in a commercial and/or Industry specific application. Proposed changes to the FEAM will permit more flexibility for tailoring of the software for multi-use purposes.

From a ISG/DoD CE/CALS Committee perspective it should be noted that both the concepts behind Functional Economic Analysis and the associated software (FEAM) developed for it's effective application are very well thought out, structured, and have been proven to be effective for the analysis of improvement alternatives. It should not go without saying that the Defense Directorate of Information (DDI), the Institute of Defense Analysis (IDA), the Defense Technical Information Center (DTIC), and the DoD OSD Defense CALS Executive (DCE) should be commended for the excellent work done on this initiative. It is efforts such as these that form a true Industry/DoD partnership.

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